Real Time Grid Reliability Management

Contract #: 500-99-013 **Work Authorization #:** UC BOA-20-21
Contractor: Lawrence Berkeley National Laboratory
Project Amount: $224,000
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Status: Active

Project Description
The Energy Commission and California Independent System Operator (CAISO) are partnering with the California utilities, Bonneville Power Administration (BPA), and the U.S. Department of Energy in the research, development and testing of a new real-time performance monitoring and data analysis system that collects and analyzes real-time data from will also set the stage for a future "smart" electricity grid that will be able to automatically sense and respond to system emergencies.

The increased need to manage the Western regional electricity grid more actively in real time is in large part a result of the ongoing transition from a system operated by monopoly utilities to a competitive energy market. This transition has confronted system operators with many dramatic changes from past practice including unregulated generation owners and market participants creating high volumes of energy trades over large distances. Markets have replaced utilities in performing the match between generation and demand, adding to the operator's burden of controlling larger areas with revised operational responsibilities and more unpredictable system behavior.

This project is the first phase of a planned three phase effort that is scheduled to be completed in 2006.

This project supports the PIER Program objectives of:

- Improving the reliability, quality, and sufficiency of California's electricity by providing operators with real-time information on the actual status of the transmission system in the Western region so that contingencies that impact system reliability can be avoided.
- Improving the energy cost/value of California's electricity by enabling technologies that will help to reduce costs associated with managing system congestion and reliability contingencies (i.e. line outages, plant outages, etc.) by reducing costly generator re-dispatch, initiating load shedding procedures, etc.

Proposed Outcomes:
The three desired outcomes of this multiyear R&D project are to:

1. To accelerate adoption and foster greater use of new, more accurate, time-synchronized Phasor measurements by CAISO reliability coordinators and control area operators as well as by California and BPA utility transmission dispatchers. This three-year phased project will provide these real-time operators with previously unavailable information on the dynamic stability of the grid, and, in the long run, may provide the basis for the introduction of a new generation of automatic grid controls. A specific research objective is to develop a prototype tool that meets

CAISO's specifications, such that, upon completion, it can be transferred to a vendor (selected by CAISO) for implementation as a production-grade operating tool.

2. To provide CAISO operators and California utility and BPA transmission dispatchers with a first-ever, voltage security assessment tool that runs in real time. This will require research and assessment of improved (faster) simulation methods. A specific research objective is to work closely with CAISO operators to develop a prototype tool that meets their specifications, such that, upon completion, it can be transferred to a vendor (selected by CAISO) for implementation as a production-grade operating tool.
3. To improve the accuracy of the system dynamic load and generator models, data and performance assessment tools used by CAISO operations engineers and planning engineers, as well as those used by their counterparts at the California utilities, to establish safe operating margins. Improved models and a better understanding of the likely impacts of remaining uncertainties in these models will increase the reliability of grid operations by allowing operators to more accurately study system voltage problems and the dynamic stability response of the system to disturbances.

Project Status:
The project is on schedule.